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FAX Cover Sheet

1100 Superior Avenue, Seventh Floor
Cleveland, Ohio 44114-2579
Telephone: 216.861.5582, Fax: 216.241.1666
www.faysharpe.com

Date:	September 9, 2008	**Total Pages:** 8 including cover sheet
To:	U.S. Patent and Trademark Office	
Attn.:	Examiner Clifton G. Daley	
Fax No.:	1 (571) 270-4144	
From:	Jeffrey N. Zahn, Reg. 54,864	
Re:	SN 10/757,490; Filed January 15, 2004 Our Docket No. A3265-US-NP / XERZ 2 01618 Last Office Action August 11, 2008 Proposed Amendments to claims	

COMMENTS:

Examiner Daley:

Per our discussion, attached is a draft of proposed claims based on my review of your Office Action dated August 11, 2008.

Please review and give me a call to discuss at your earliest convenience.

Thank you,

Jeff Zahn
Direct Phone: 216-363-9168

Patent
Atty.Dkt.No. A3265-US-NP
XERZ 2 01618

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

AMENDMENT B	Title: METHOD AND APPARATUS FOR AUTOMATICALLY DETERMINING IMAGE FOREGROUND COLOR	
	First Named Inventor:	Kimberly Moravec et al.
	Application No.:	10/757,490
	Filing Date:	January 15, 2004
	Confirmation No.	4166
	Examiner:	Clifton G. Daley
Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450	Art Unit:	2624
	Last Office Action:	August 11, 2008

PROPOSED CLAIMS

1. (Currently Amended) A method for automatically determining a foreground color for a digital image, comprising:

(a) automatically dividing the colors of the pixels of at least a part of the digital image into a number of color clusters in a color space;

(b) automatically segmenting the part of the digital image into regions according to the color clusters;

(c) automatically grouping the color clusters into interference clusters comprising a pixel in a selected region of the image and benign clusters comprising no pixel in the selected region;

(d) automatically selecting a foreground color being related to [[all]] at least one interference clusters according to predetermined criteria and the foreground color being selected according to a color harmony criterian with respect to at least one benign cluster; and

(e) one of automatically displaying, storing and communicating data representing the selected foreground color.

2. (Currently Amended) The method according to claim 1, wherein said selecting at [[(b)]] (d) further comprises:

selecting a harmonious color set with respect to the color clusters; and

testing the harmonious color set for legibility.

3. (Original) The method according to claim 2, wherein said testing the harmonious color set for legibility further comprises:

computing local measures of contrast between background and foreground in a neighborhood of a predetermined foreground region; and

computing a legibility score representative of a lowest few contrast values observed over the predetermined foreground region.

4. (Previously Presented) The method according to claim 2, wherein the foreground color is selected according to a legibility criterion for a predetermined foreground region by:

computing local measures of contrast between background and foreground in a neighborhood for a predetermined foreground region; and

computing a legibility score representative of a lowest few contrast values observed over the predetermined foreground region.

5. (Original) The method according to claim 1, wherein said dividing at (a) comprises converting the image data to a predetermined color format.

6. (Original) The method according to claim 1, wherein said dividing at (a) comprises using an Expectation-Maximization clustering.

7. (Original) The method according to claim 1, wherein said dividing at (a) comprises determining the number of clusters using a model selection method one of a Bayesian Information Criterion and a Universal Model-based Minimum Description Length Principle.

8. (Canceled)

9. (Previously Presented) The method according to claim 1, wherein the segmenting comprises using one of a normalized cut criterion and an energy-minimization method.

10. (Canceled)

11. (Previously Presented) The method according to claim 1, wherein the foreground color is selected according to a legibility criterion for a predetermined foreground region.

12. (Previously Presented) The method according to claim 11, wherein the foreground color is selected based on a likelihood ratio of the hypothesis that the digital image contains the foreground region and the hypothesis that the digital image does not contain the foreground region.

13. (Previously Presented) The method according claim 12, wherein selecting the foreground color comprises computing the legibility of $\min_{x \in I} \max_{y \in C_\varepsilon^2} r(x+y)$, wherein $r(x) = h \log \frac{\Pr(I(x)|T)}{\Pr(I(x)|B)}$, C_ε^2 is a disc of radius ε and wherein $\Pr(I(x)|T)$ denotes heuristic or other models of likelihoods that the image I contains text T at a given pixel x and $\Pr(I(x)|B)$ denotes heuristic or other models of likelihoods that the image I contains background B at the given pixel x.

14. (Canceled)

15. (Previously Presented) The method according to claim 14, wherein the foreground color is selected according to at least one of a monotonic, a complementary, and a p-adic color harmony criterion in HSL space.

16. (Previously Presented) The method according to claim 14, wherein the foreground color is selected according to a color harmony criterion with respect to at least one interference cluster.

17. (Canceled)

18. (Currently Amended) The method according to claim [[14]] 1, wherein the foreground color is selected according to a color harmony criterion with respect to ~~at least one~~ all interference clusters and at least one benign cluster.

19. (Previously Presented) The method according to claim 1, wherein said selecting at (d) comprises determining a color subset according to a color harmony criterion and maximizing a legibility function in the color subset.

20. (Previously Presented) The method according to claim 1, wherein the foreground color is selected for which $\sum_{i=1}^{N}\alpha_i l(c,P_i)+\sum_{k=1}^{M}\gamma_k h(c,K_k)$ is maximal, wherein c denotes the foreground color, P_i denote the interference clusters, K_k denote all clusters, both benign and interference, l is a legibility function in color space, h is a color harmony function, and α_i and γ_k are weighting factors.

21. (Previously Presented) The method according to claim 1, further comprising one of displaying and storing a predetermined object using the selected foreground color together with the digital image.

22. (Canceled)

23. (Canceled)

24. (Canceled)

25. (Canceled)

26. (New) An apparatus for automatically determining a foreground color for a digital image comprising:

a processor which executes computer readable instructions, stored in a memory, to perform the method comprising:

(a) automatically dividing the colors of the pixels of at least a part of the digital image into a number of color clusters in a color space;

(b) automatically segmenting the part of the digital image into regions according to the color clusters;

(c) automatically grouping the color clusters into interference clusters comprising a pixel in a selected region of the image and benign clusters comprising no pixel in the selected region;

(d) automatically selecting a foreground color being related to at least one interference clusters according to predetermined criteria and the foreground color being selected according to a color harmony criterian with respect to at least one benign cluster; and

(e) one of automatically displaying, storing and communicating data representing the selected foreground color.

27. (New) The apparatus according to claim 26, wherein said selecting at (d) further comprises:

selecting a harmonious color set with respect to the color clusters; and

testing the harmonious color set for legibility.

28. (New) The apparatus according to claim 27, wherein said testing the harmonious color set for legibility further comprises:

computing local measures of contrast between background and foreground in a neighborhood of a predetermined foreground region; and

computing a legibility score representative of a lowest few contrast values observed over the predetermined foreground region.

29. (New) A computer program product comprising:

a computer-usable data carrier storing instructions that, when executed by a computer, cause the computer to perform a method comprising:

(a) automatically dividing the colors of the pixels of at least a part of the digital image into a number of color clusters in a color space;

(b) automatically segmenting the part of the digital image into regions according to the color clusters;

(c) automatically grouping the color clusters into interference clusters comprising a pixel in a selected region of the image and benign clusters comprising no pixel in the selected region;

(d) automatically selecting a foreground color being related to at least one interference clusters according to predetermined criteria and the foreground color being selected according to a color harmony criterian with respect to at least one benign cluster; and

(e) one of automatically displaying, storing and communicating data representing the selected foreground color.

30. (New) The computer program product according to claim 29, wherein said selecting at (d) further comprises:

selecting a harmonious color set with respect to the color clusters; and

testing the harmonious color set for legibility.

31. (New) The computer program product according to claim 30, wherein said testing the harmonious color set for legibility further comprises:

computing local measures of contrast between background and foreground in a neighborhood of a predetermined foreground region; and

computing a legibility score representative of a lowest few contrast values observed over the predetermined foreground region.

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